

FY 99 Accelerated Site Technology Deployment

Technology Fact Sheet Re-Use of Concrete within DOE from D&D Projects

Idaho Operations Office
In Partnership with the Office of Science & Technology

Introduction

Nearly all of the approximately 100 buildings which have been Decontaminated and Decommissioned (D&D) to date at the Idaho National Engineering and Environmental Laboratory (INEEL) have contained large amounts of concrete. While most of this concrete has not been contaminated, some portion of it has been contaminated with radioactive or chemical constituents. Because of the difficulties and uncertainties associated with the release of concrete for reuse, much of the uncontaminated concrete is treated as though it were contaminated and is disposed as low-level radioactive waste in the INEEL Radioactive Waste Management Complex. This approach is used throughout the DOE complex. Disposal at a radioactive or sanitary waste site can be costly and eliminates the opportunity to economically recycle or reuse the concrete.

Though many relatively small facilities have previously been decommissioned at the INEEL, many large facilities such as the Power Burst Facility (PBF), Engineering Test Reactor (ETR), Materials Test Reactor (MTR), and a variety of waste handling and laboratory facilities will be decommissioned over the next several years. Each of these facilities contains massive amounts of concrete, which represents tremendous savings potential if it can be recycled and reused.

Technical Need

The Department of Energy (DOE) estimates a current complex-wide inventory of over 380 million cubic feet of concrete. At the INEEL alone, the volume of contaminated concrete is estimated to be as high as 354,000 ft³, while the non-contaminated concrete is estimated at 7.7 million ft³ [Dickerson, K. S. Wilson-Nichols, M. J., and Morris, M. I., 1995, DOE/ORO/2034].

Studies have shown that hundreds of millions of dollars can be saved if the concrete from complex-wide DOE D&D projects is reused.

System Description

The purpose of this ASTD project is to develop a protocol to assist DOE sites in releasing concrete for reuse. Current

D&D Project at the INEEL, removing concrete



regulations allow the sites to release surface-contaminated materials if their radioactivity falls below certain levels, and to possibly release materials with volumetric contamination or higher levels of surface contamination on a case-by-case basis. In all cases, an ALARA (as low as reasonably achievable) analysis is required as part of the release process. The protocol provides a standardized approach, including ALARA analysis, for evaluating the risks of releasing volumetrically contaminated or higher levels of surface contaminated concrete, so new release standards can be proposed and set, allowing reuse of the concrete.

To evaluate the dose impacts of reusing radioactively contaminated material, the measured radiation levels (pCi/g or disintegrations per minute [dpm]/100 cm²) must be converted to the estimated dose (mrem/yr) that would be received by affected individuals. The dose depends on the amounts and types of isotopes present and the time, distance, and method of exposure (e.g., inhalation, ingestion, or external exposure). For each disposition alternative, the protocol provides a systematic method to evaluate the impact of the dose on the affected individuals and the cost impacts of reusing concrete.

Benefits

The protocol provides a method to perform a detailed evaluation of the dose and cost impacts for various concrete disposition alternatives. Once the dose and cost



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impacts of the various alternatives have been estimated, the protocol outlines the steps required to propose new release standards that allow release and reuse of the concrete.

The protocol can then be applied on a complex-wide basis to reduce the cost of D&D operations involving concrete removal by allowing for reuse of concrete that meets EPA regulations and DOE orders.

Status

In June of 2000, the protocol was completed and subsequently released for distribution. In addition, a case study was completed using the protocol for decommissioning of the sewage treatment plant (STP) at the Central Facilities Area (CFA) of INEEL. The potential radiological dose and costs for several concrete disposition alternatives were evaluated. The results of the analysis indicated that crushing and reusing the concrete or demolishing and disposal in a non-radiological landfill were the lowest cost options that resulted in doses below commonly accepted levels. Both options eliminate the need for costly decontamination. A factor contributing to

these results was the generally low levels of contamination at the STP.

The concrete reuse protocol provides a guidance document that identifies the steps to meet EPA regulations and DOE Orders. Using an ALARA analysis, it compares costs and risks of various disposition alternatives. It defines how to develop release levels and provides a generic approach that applies DOE complex-wide.

In FY 2001, the INEEL is working to write a draft American Society for Testing and Materials Standard Guide, so that the methodology of the protocol can be applied industry wide, outside of the DOE complex.

Both the "Protocol for Development of Authorized Release Limits for Concrete at U.S. DOE Sites" and the "Concrete Release Protocol Case Studies for Decommissioning Work at the INEEL" can be found on the Deactivation and Decommissioning Focus Area homepage at www.netl.doe.gov/dd/.

For more information about this ASTD project for the Re-Use of Concrete at the Idaho National Environmental and Engineering Laboratory

Contact:

Chelsea Hubbard, DOE-Idaho at (208) 526-0645, e-mail Hubbarc@inel.gov

Dick Meserve, BWXT Idaho at (208) 526-1834, e-mail rhm@inel.gov

S.Y. Chen, ANL-E at (630) 252-7695, e-mail syichen@anl.gov

S. Kamboj, ANL-E at (630) 252-5457, e-mail skamboj@anl.gov

Steve Bossart, DOE-FETC at (304) 285-4643, e-mail steven.bossart@netl.doe.gov

